

## SEQUENCE LISTING

<110> Merck & Co., Inc.  
Uebel, Victor N.  
Connolly, Thomas M.

<120> NUCLEIC ACID MOLECULES ENCODING NOVEL  
MURINE LOW-VOLTAGE ACTIVATED CALCIUM CHANNEL PROTEINS  
DESIGNATED - a1h, ENCODED PROTEINS AND METHODS OF USE  
THEREOF

<130> 21314-PCT

<140> To be advised  
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<151> 2004-02-18

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His Gly Gln Gly Pro Gly Arg Arg Pro Arg Arg Ala Gly Arg Arg Thr  
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Ala Ser Val His His Leu Val Tyr His His His His His His His  
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His Tyr His Phe Ser His Gly Gly Pro Arg Arg Pro Ser Pro Glu Pro  
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Ala His Ser Ile Ala Thr Ala Ala Ser Leu Lys Leu Ala Ser Gly Leu  
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Asn Cys Val Thr Leu Gly Met Phe Arg Pro Cys Glu Asp Val Glu Cys  
 115 120 125

Arg Ser Glu Arg Cys Ser Ile Leu Glu Ala Phe Asp Asp Phe Ile Phe  
 130 135 140

Ala Phe Phe Ala Val Glu Met Val Ile Lys Met Val Ala Leu Gly Leu  
 145 150 155 160

Phe Gly Gln Lys Cys Tyr Leu Gly Asp Thr Trp Asn Arg Leu Asp Phe  
 165 170 175

Phe Ile Val Met Ala Gly Met Met Glu Tyr Ser Leu Asp Gly His Asn  
 180 185 190

Val Ser Leu Ser Ala Ile Arg Thr Val Arg Val Leu Arg Pro Leu Arg  
 195 200 205

Ala Ile Asn Arg Val Pro Ser Met Arg Ile Leu Val Thr Leu Leu Leu  
 210 215 220

Asp Thr Leu Pro Met Leu Gly Asn Val Leu Leu Cys Phe Phe Val  
 225 230 235 240

Phe Phe Ile Phe Gly Ile Val Gly Val Gln Leu Trp Ala Gly Leu Leu  
 245 250 255

Arg Asn Arg Cys Phe Leu Asp Ser Ala Phe Val Arg Asn Asn Asn Leu  
 260 265 270

Thr Phe Leu Arg Pro Tyr Tyr Gln Thr Glu Glu Gly Glu Glu Asn Pro  
 275 280 285

Phe Ile Cys Ser Ser Arg Arg Asp Asn Gly Met Gln Lys Cys Ser His  
 290 295 300

Ile Pro Ser Arg Arg Glu Leu Arg Val Gln Cys Thr Leu Gly Trp Glu  
 305 310 315 320

Ala Tyr Gly Gln Pro Gln Ala Glu Asp Gly Gly Ala Gly Arg Asn Ala  
 325 330 335

Cys Ile Asn Trp Asn Gln Tyr Tyr Asn Val Cys Arg Ser Gly Glu Phe  
 340 345 350

Asn Pro His Asn Gly Ala Ile Asn Phe Asp Asn Ile Gly Tyr Ala Trp  
 355 360 365

Ile Ala Ile Phe Gln Val Ile Thr Leu Glu Gly Trp Val Asp Ile Met  
 370 375 380

Tyr Tyr Val Met Asp Ala His Ser Phe Tyr Asn Phe Ile Tyr Phe Ile  
 385 390 395 400

Leu Leu Ile Ile Val Gly Ser Phe Phe Met Ile Asn Leu Cys Leu Val  
 405 410 415

Val Ile Ala Thr Gln Phe Ser Glu Thr Lys Gln Arg Glu Asn Gln Leu  
                   420                  425                  430  
 Met Arg Glu Gln Arg Ala Arg Tyr Leu Ser Asn Asp Ser Thr Leu Ala  
                   435                  440                  445  
 Ser Phe Ser Glu Pro Gly Ser Cys Tyr Glu Glu Leu Leu Lys Tyr Val  
                   450                  455                  460  
 Gly His Ile Phe Arg Lys Val Lys Arg Arg Ser Leu Arg Leu Tyr Ala  
                   465                  470                  475                  480  
  
 Arg Trp Gln Ser Arg Trp Arg Lys Lys Val Asp Pro Ser Ser Thr Val  
                   485                  490                  495  
 His Gly Gln Gly Pro Gly Arg Arg Pro Arg Arg Ala Gly Arg Arg Thr  
                   500                  505                  510  
 Ala Ser Val His His Leu Val Tyr His His His His His His His  
                   515                  520                  525  
 His Tyr His Phe Ser His Gly Gly Pro Arg Arg Pro Ser Pro Glu Pro  
                   530                  535                  540  
 Gly Ala Gly Asp Asn Arg Leu Val Arg Ala Cys Ala Pro Pro Ser Pro  
                   545                  550                  555                  560  
 Pro Ser Pro Gly His Gly Pro Pro Asp Ser Glu Ser Val His Ser Ile  
                   565                  570                  575  
 Tyr His Ala Asp Cys His Val Glu Gly Pro Gln Glu Arg Ala Arg Val  
                   580                  585                  590  
 Ala His Ser Ile Ala Thr Ala Ala Ser Leu Lys Leu Ala Ser Gly Leu  
                   595                  600                  605  
 Gly Thr Met Asn Tyr Pro Thr Ile Leu Pro Ser Gly Thr Val Asn Ser  
                   610                  615                  620  
 Lys Gly Gly Thr Ser Ser Arg Pro Lys Gly Leu Arg Gly Ala Gly Ala  
                   625                  630                  635                  640  
 Pro Gly Ala Ala Val His Ser Pro Leu Ser Leu Gly Ser Pro Arg Pro  
                   645                  650                  655  
 Tyr Glu Lys Ile Gln His Val Val Gly Glu Gln Gly Leu Gly Arg Ala  
                   660                  665                  670  
 Ser Ser His Leu Ser Gly Leu Ser Val Pro Cys Pro Leu Pro Ser Pro  
                   675                  680                  685  
 Gln Ala Gly Thr Leu Thr Cys Glu Leu Lys Ser Cys Pro Tyr Cys Ala  
                   690                  695                  700  
 Ser Ala Leu Glu Asp Pro Glu Phe Glu Phe Ser Gly Ser Glu Ser Gly  
                   705                  710                  715                  720  
 Asp Ser Asp Ala His Gly Val Tyr Glu Phe Thr Gln Asp Val Arg His  
                   725                  730                  735  
 Gly Asp Cys Arg Asp Pro Val Gln Gln Pro His Glu Val Gly Thr Pro  
                   740                  745                  750  
 Gly His Ser Asn Glu Arg Arg Arg Thr Pro Leu Arg Lys Ala Ser Gln  
                   755                  760                  765  
 Pro Gly Gly Ile Gly His Leu Trp Ala Ser Phe Ser Gly Lys Leu Arg  
                   770                  775                  780  
 Arg Ile Val Asp Ser Lys Tyr Phe Asn Arg Gly Ile Met Ala Ala Ile  
                   785                  790                  795                  800  
 Leu Val Asn Thr Leu Ser Met Gly Val Glu Tyr His Glu Gln Pro Glu  
                   805                  810                  815  
 Glu Leu Thr Asn Ala Leu Glu Ile Ser Asn Ile Val Phe Thr Ser Met  
                   820                  825                  830  
 Phe Ala Leu Glu Met Leu Leu Lys Leu Leu Ala Cys Gly Pro Leu Gly  
                   835                  840                  845

Tyr Ile Arg Asn Pro Tyr Asn Ile Phe Asp Gly Ile Val Val Val Ile  
 850 855 860  
 Ser Val Trp Glu Ile Val Gly Gln Ala Asp Gly Gly Leu Ser Val Leu  
 865 870 875 880  
 Arg Thr Phe Arg Leu Leu Arg Val Leu Lys Leu Val Arg Phe Leu Pro  
 885 890 895  
 Ala Leu Arg Arg Gln Leu Val Val Leu Met Arg Thr Met Asp Asn Val  
 900 905 910

Ala Thr Phe Cys Met Leu Leu Met Leu Phe Ile Phe Ile Phe Ser Ile  
 915 920 925  
 Leu Gly Met His Leu Phe Gly Cys Lys Phe Ser Leu Lys Thr Asp Ser  
 930 935 940  
 Gly Asp Thr Val Pro Asp Arg Lys Asn Phe Asp Ser Leu Leu Trp Ala  
 945 950 955 960  
 Ile Val Thr Val Phe Gln Ile Leu Thr Gln Glu Asp Trp Asn Val Val  
 965 970 975  
 Leu Tyr Asn Gly Met Ala Ser Thr Ser Trp Ala Ala Leu Tyr Phe  
 980 985 990  
 Val Ala Leu Met Thr Phe Gly Asn Tyr Val Leu Phe Asn Leu Leu Val  
 995 1000 1005  
 Ala Ile Leu Val Glu Gly Phe Gln Ala Glu Gly Asp Ala Thr Arg Ser  
 1010 1015 1020  
 Asp Thr Asp Glu Asp Lys Thr Ser Thr Gln Leu Glu Gly Asp Phe Asp  
 1025 1030 1035 1040  
 Lys Leu Arg Asp Leu Arg Ala Thr Glu Met Lys Met Tyr Ser Leu Ala  
 1045 1050 1055  
 Val Thr Pro Asn Gly His Leu Glu Gly Arg Gly Ser Leu Pro Pro Pro  
 1060 1065 1070  
 Leu Ile Thr His Thr Ala Ala Thr Pro Met Pro Thr Pro Lys Ser Ser  
 1075 1080 1085  
 Pro Asn Leu Asp Val Ala His Ala Leu Leu Asp Ser Arg Arg Ser Ser  
 1090 1095 1100  
 Ser Gly Ser Val Asp Pro Gln Leu Gly Asp Gln Lys Ser Leu Ala Ser  
 1105 1110 1115 1120  
 Leu Arg Ser Ser Pro Cys Thr Pro Trp Gly Pro Asn Ser Ala Gly Ser  
 1125 1130 1135  
 Ser Arg Arg Ser Ser Trp Asn Ser Leu Gly Arg Ala Pro Ser Leu Lys  
 1140 1145 1150  
 Arg Arg Ser Gln Cys Gly Glu Arg Glu Ser Leu Leu Ser Gly Glu Gly  
 1155 1160 1165  
 Lys Gly Ser Thr Asp Asp Glu Ala Glu Asp Ser Arg Pro Ser Thr Gly  
 1170 1175 1180  
 Thr His Pro Gly Ala Ser Pro Gly Pro Arg Ala Thr Pro Leu Arg Arg  
 1185 1190 1195 1200  
 Ala Glu Ser Leu Asp His Arg Ser Thr Leu Asp Leu Cys Pro Pro Arg  
 1205 1210 1215  
 Pro Ala Ala Leu Leu Pro Thr Lys Phe His Asp Cys Asn Gly Gln Met  
 1220 1225 1230  
 Val Ala Leu Pro Ser Glu Phe Phe Leu Arg Ile Asp Ser His Lys Glu  
 1235 1240 1245  
 Asp Ala Ala Glu Phe Asp Asp Asp Ile Glu Asp Ser Cys Cys Phe Arg  
 1250 1255 1260  
 Leu His Lys Val Leu Glu Pro Tyr Ala Pro Gln Trp Cys Arg Ser Arg  
 1265 1270 1275 1280

Glu Ser Trp Ala Leu Tyr Leu Phe Pro Pro Gln Asn Arg Leu Arg Val  
 1285 1290 1295  
 Ser Cys Gln Lys Val Ile Ala His Lys Met Phe Asp His Val Val Leu  
 1300 1305 1310  
 Val Phe Ile Phe Leu Asn Cys Ile Thr Ile Ala Leu Glu Arg Pro Asp  
 1315 1320 1325  
 Ile Asp Pro Gly Ser Thr Glu Arg Ala Phe Leu Ser Val Ser Asn Tyr  
 1330 1335 1340  
  
 Ile Phe Thr Ala Ile Phe Val Val Glu Met Met Val Lys Val Val Ala  
 1345 1350 1355 1360  
 Leu Gly Leu Leu Trp Gly Glu His Ala Tyr Leu Gln Ser Ser Trp Asn  
 1365 1370 1375  
 Val Leu Asp Gly Leu Leu Val Leu Val Ser Leu Val Asp Ile Ile Val  
 1380 1385 1390  
 Ala Met Ala Ser Ala Gly Gly Ala Lys Ile Leu Gly Val Leu Arg Val  
 1395 1400 1405  
  
 Leu Arg Leu Leu Arg Thr Leu Arg Pro Leu Arg Val Ile Ser Arg Ala  
 1410 1415 1420  
 Pro Gly Leu Lys Leu Val Val Glu Thr Leu Ile Ser Ser Leu Arg Pro  
 1425 1430 1435 1440  
 Ile Gly Asn Ile Val Leu Ile Cys Cys Ala Phe Phe Ile Ile Phe Gly  
 1445 1450 1455  
 Ile Leu Gly Val Gln Leu Phe Lys Gly Lys Phe Tyr Tyr Cys Glu Gly  
 1460 1465 1470  
 Thr Asp Thr Arg Asn Ile Thr Thr Lys Ala Glu Cys His Ala Ala His  
 1475 1480 1485  
 Tyr Arg Trp Val Arg Arg Lys Tyr Asn Phe Asp Asn Leu Gly Gln Ala  
 1490 1495 1500  
 Leu Met Ser Leu Phe Val Leu Ser Ser Lys Asp Gly Trp Val Asn Ile  
 1505 1510 1515 1520  
 Met Tyr Asp Gly Leu Asp Ala Val Gly Ile Asp Gln Gln Pro Val Gln  
 1525 1530 1535  
 Asn His Asn Pro Trp Met Leu Leu Tyr Phe Ile Ser Phe Leu Leu Ile  
 1540 1545 1550  
 Val Ser Phe Phe Val Leu Asn Met Phe Val Gly Val Val Val Glu Asn  
 1555 1560 1565  
 Phe His Lys Cys Arg Gln His Gln Glu Ala Glu Glu Ala Arg Arg Arg  
 1570 1575 1580  
 Glu Glu Lys Arg Leu Arg Arg Leu Glu Arg Arg Arg Arg Lys Ala Gln  
 1585 1590 1595 1600  
 Arg Arg Pro Tyr Tyr Ala Asp Tyr Ser His Thr Arg Arg Ser Ile His  
 1605 1610 1615  
 Ser Leu Cys Thr Ser His Tyr Leu Asp Leu Phe Ile Thr Phe Ile Ile  
 1620 1625 1630  
 Cys Leu Asn Val Ile Thr Met Ser Met Glu His Tyr Asn Gln Pro Lys  
 1635 1640 1645  
 Ser Leu Asp Glu Ala Leu Lys Tyr Cys Asn Tyr Val Phe Thr Ile Val  
 1650 1655 1660  
 Phe Val Phe Glu Ala Ala Leu Lys Leu Val Ala Phe Gly Phe Arg Arg  
 1665 1670 1675 1680  
 Phe Phe Lys Asp Arg Trp Asn Gln Leu Asp Leu Ala Ile Val Leu Leu  
 1685 1690 1695  
 Ser Ile Met Gly Ile Ala Leu Glu Glu Ile Glu Met Asn Ala Ala Leu

1700	1705	1710	
Pro Ile Asn Pro Thr Ile Ile Arg Ile Met Arg Val Leu Arg Ile Ala			
1715	1720	1725	
Arg Val Leu Lys Leu Leu Lys Met Ala Thr Gly Met Arg Ala Leu Leu			
1730	1735	1740	
Asp Thr Val Val Gln Ala Leu Pro Gln Val Gly Asn Leu Gly Leu Leu			
1745	1750	1755	1760
Phe Met Leu Leu Phe Phe Ile Tyr Ala Ala Leu Gly Val Glu Leu Phe			
1765	1770	1775	
Gly Arg Leu Glu Cys Ser Glu Asp Asn Pro Cys Glu Gly Leu Ser Arg			
1780	1785	1790	
His Ala Thr Phe Thr Asn Phe Gly Met Ala Phe Leu Thr Leu Phe Arg			
1795	1800	1805	
Val Ser Thr Gly Asp Asn Trp Asn Gly Ile Met Lys Asp Thr Leu Arg			
1810	1815	1820	
Glu Cys Thr Arg Glu Asp Lys His Cys Leu Ser Tyr Leu Pro Ala Leu			
1825	1830	1835	1840
Ser Pro Val Tyr Phe Val Thr Phe Val Leu Val Ala Gln Phe Val Leu			
1845	1850	1855	
Val Asn Val Val Ala Val Leu Met Lys His Leu Glu Glu Ser Asn			
1860	1865	1870	
Lys Glu Ala Arg Glu Asp Ala Glu Met Asp Ala Glu Ile Glu Leu Glu			
1875	1880	1885	
Met Ala Gln Gly Ser Thr Ala Gln Pro Pro Pro Thr Ala Gln Glu Ser			
1890	1895	1900	
Gln Gly Thr Gln Pro Asp Thr Pro Asn Leu Leu Val Val Arg Lys Val			
1905	1910	1915	1920
Ser Val Ser Arg Met Leu Ser Leu Pro Asn Asp Ser Tyr Met Phe Arg			
1925	1930	1935	
Pro Val Ala Pro Ala Ala Ala Pro His Ser His Pro Leu Gln Glu Val			
1940	1945	1950	
Glu Met Glu Thr Tyr Thr Gly Pro Val Thr Ser Ala His Ser Pro Pro			
1955	1960	1965	
Leu Glu Pro Arg Ala Ser Phe Gln Val Pro Ser Ala Ala Ser Ser Pro			
1970	1975	1980	
Ala Arg Val Ser Asp Pro Leu Cys Ala Leu Ser Pro Arg Gly Thr Pro			
1985	1990	1995	2000
Arg Ser Leu Ser Leu Ser Arg Ile Leu Cys Arg Gln Glu Ala Met His			
2005	2010	2015	
Ser Glu Ser Leu Glu Gly Lys Val Asp Asp Val Gly Gly Asp Ser Ile			
2020	2025	2030	
Pro Asp Tyr Thr Glu Pro Ala Glu Asn Met Ser Thr Ser Gln Ala Ser			
2035	2040	2045	
Thr Gly Ala Pro Arg Ser Pro Pro Cys Ser Pro Arg Pro Ala Ser Val			
2050	2055	2060	
Arg Thr Arg Lys His Thr Phe Gly Gln Arg Cys Ile Ser Ser Arg Pro			
2065	2070	2075	2080
Pro Thr Leu Gly Gly Asp Glu Ala Glu Ala Ala Asp Pro Ala Asp Glu			
2085	2090	2095	
Glu Val Ser His Ile Thr Ser Ser Ala His Pro Trp Pro Ala Thr Glu			
2100	2105	2110	
Pro His Ser Pro Glu Ala Ser Pro Thr Ala Ser Pro Val Lys Gly Thr			
2115	2120	2125	

Met Gly Ser Gly Arg Asp Pro Arg Arg Phe Cys Ser Val Asp Ala Gln  
2130 2135 2140  
Ser Phe Leu Asp Lys Pro Gly Arg Pro Asp Ala Gln Arg Trp Ser Ser  
2145 2150 2155 2160  
Val Glu Leu Asp Asn Gly Glu Ser His Leu Glu Ser Gly Glu Val Arg  
2165 2170 2175  
Gly Arg Ala Ser Glu Leu Glu Pro Ala Leu Gly Ser Arg Arg Lys Lys  
2180 2185 2190  
Lys Met Ser Pro Pro Cys Ile Ser Ile Glu Pro Pro Thr Glu Asp Glu  
2195 2200 2205  
  
Gly Ser Ser Arg Pro Pro Ala Ala Glu Gly Gly Asn Thr Thr Leu Arg  
2210 2215 2220  
Arg Arg Thr Pro Ser Cys Glu Ala Ala Leu His Arg Asp Cys Pro Glu  
2225 2230 2235 2240  
Pro Thr Glu Gly Pro Gly Thr Gly Gly Asp Pro Val Ala Lys Gly Glu  
2245 2250 2255  
Arg Trp Gly Gln Ala Ser Cys Arg Ala Glu His Leu Thr Val Pro Asn  
2260 2265 2270  
Phe Ala Phe Glu Pro Leu Asp Met Gly Gly Pro Gly Gly Asp Cys Phe  
2275 2280 2285  
Leu Asp Ser Asp Gln Ser Val Thr Pro Glu Pro Arg Val Ser Ser Leu  
2290 2295 2300  
Gly Ala Ile Val Pro Leu Ile Leu Glu Thr Glu Leu Ser Met Pro Ser  
2305 2310 2315 2320  
Gly Asp Cys Pro Glu Lys Glu Gln Gly Leu Tyr Leu Thr Val Pro Gln  
2325 2330 2335  
Thr Pro Leu Lys Pro Gly Ser Thr Pro Ala Thr Pro Ala Pro Asp  
2340 2345 2350  
Asp Ser Gly Asp Glu Pro Val  
2355